

FCC EVALUATION REPORT FOR CERTIFICATION

Applicant: LG Electronics Inc.

19-1, Cheongho-ri, Jinwi-myeon,

Pyeongteak-si, Gyeonggi-do, Korea.

Attn: Mr. Do-Hyung Kim, Chief research engineer

Date of Issue: June 2, 2011

Order Number: GETEC-C1-11-108

Test Report Number: GETEC-E3-11-043

Test Site: Gumi College EMC Center

FCC Registration Number: (100749, 443957)

FCC ID. : BEJD2770P

Applicant : LG Electronics Inc.

Rule Part(s)	: FCC Part 15 Subpart B
Equipment Class	: Class B computing device peripheral (JBP)
EUT Type	: LED LCD Monitor
Type of Authority	: Certification
Model Name	: D2770P
Trade Name	: LG

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003 / Canadian standard ICES-003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by,

Reviewed by,

Soon Hoon

Soon-Hoon Jeong, Associate Engineer
GUMI College EMC center

Jae-Hoon Jeong

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GUMI College EMC center



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Scope: Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.

1. General Information

Applicant: LG Electronics Inc.

Applicant Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.

Manufacturer: LG Electronics Inc.

Manufacturer Address: 19-1, Cheongho-ri, Jinwi-myeon, Pyeongteak-si, Gyeonggi-do, Korea.

Contact Person: Mr. Do-Hyung Kim, Chief research engineer

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- **FCC ID.** BEJD2770P
- **EUT Type** LED LCD Monitor
- **Model Name** D2770P
- **Trade Name** LG
- **Serial Number** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003) / Canadian standard ICES-003
- **Dates of Test** May 26 ~ 31, 2011
- **Place of Test** **Gumi College EMC Center** (FCC Registration Number: 100749, 443957)
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-11-043
- **Dates of Issue** June 2, 2011



2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **LG Electronics Inc. LED LCD Monitor (Model Name: D2770P)**

These measurement tests were conducted at **Gumi College EMC Center**.

The site address is 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.

This test site is one of the highest point of Gumi 1 college at about 200 km away from Seoul city and 40 km away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 (2003)



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Fig 1. The map above shows the Gumi College in vicinity area.



3. Product Information

3.1 Description of EUT

The Equipment under Test (EUT) is the **LG Electronics Inc. LED LCD Monitor (Model Name: D2770P) FCC ID.: BEJD2770P**

Display	Screen Type	68.6 cm (27 inch) Hard coating(3H) & Anti-Glare treatment of the front polarizer Visible diagonal size: 68.6 cm
	Pixel Pitch	0.3114 mm x 0.3114 mm (Pixel Pitch)
Sync Input	Horizontal Frequency	30 kHz to 83 kHz (Automatic)
	Vertical Frequency	56Hz to 75Hz (D-SUB, DVI-D) 56Hz to 61Hz (HDMI)
	Input Form	Separate Sync. Digital
Video Input	Signal Input	15 pin D-SUB Connector /DVI-D Connector (Digital) HDMI Connector
	Input Form	RGB Analog (0.7 Vp-p/ 75 ohm), Digital
Resolution	Max	D-SUB(Analog) : 1920 x 1080 @ 60 Hz DVI / HDMI (Digital) : 1920 x 1080 @ 60 Hz
	Recommend	VESA 1920 x 1080 @ 60 Hz
Plug & Play	DDC 2B(Analog,Digital,HDMI)	
Power Consumption	On Mode : 40 W(Typ.) Sleep Mode ≤ 0.5 W Off Mode ≤ 0.5 W	
Power Input	AC 100-240 V~ 50 / 60 Hz 1.5 A	
Dimensions (Width x Height x Depth)	With Stand	65.46 cm x 48.85 cm x 23.08 cm
	Without Stand	65.46 cm x 40.45 cm x 6.04 cm
Weight	5.69 kg	

-. Maximum Frequency Range : 148.5 MHz



3.2 Support Equipment / Cables used

3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
PC	DNACOM	ASB-770iCafe	S/N: N/A FCC ID.: DoC
Video card	Rextechnology Co., Ltd.	HD4850	S/N: L5H041947 FCC ID.: DoC
PS2 keyboard	COMPAQ	166516-AD6	S/N: B13BBOR391006D FCC ID.: AQ6-23K15
PS2 mouse	LOGITECH	M-S69	S/N: 334684-108 FCC ID.: JNZ211443
Joy stick	MICROSOFT	X05-92626	S/N: 9262600296169 FCC ID.: DoC
Headset	PHILIPS	SBC HL140	S/N: N/A FCC ID.: DoC

See “Appendix D – Test Setup Photographs” for actual system test set-up

3.2.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
None.	-	-	S/N: N/A FCC ID.: N/A

3.2.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the EUT	1.80 m unshielded
RGB(Analog) in cable	Connected to the EUT and PC	1.80 m shielded
DVI(Digital) in cable	Connected to the EUT and PC	2.00 m shielded
HDMI(Digital) in cable	Connected to the EUT and PC	2.00 m shielded
Headset cable	Connected to the EUT and headset	1.20 m shielded

3.3 Modification Item(s)

- None



4. Description of tests

4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s)

- . Monitor mode

Radiated emission: 1 920 × 1 080 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)

Conducted emission: 1 920 × 1 080 / 60 Hz (RGB: Analog, HDMI/DVI: Digital)

1 024 × 768 / 60 Hz (RGB: Analog), 640 × 480 / 60 Hz (RGB: Analog)

◆ Operating test pattern

- . “H” character scrolling mode (Font size: 10)
- . Black background white character
- . Brightness and contrast was adjusted as maximum level
- . Continuous playback of 1 kHz audio file with winamp player



4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (FCC Registration No.: 100749)

The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.

The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).

The EMI test receiver was scanned from 150 kHz to 30 MHz with 20 ms sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.

The bandwidth of Quasi-peak mode was set to 9 kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

Each EME reported was calibrated using the R/S signal generator

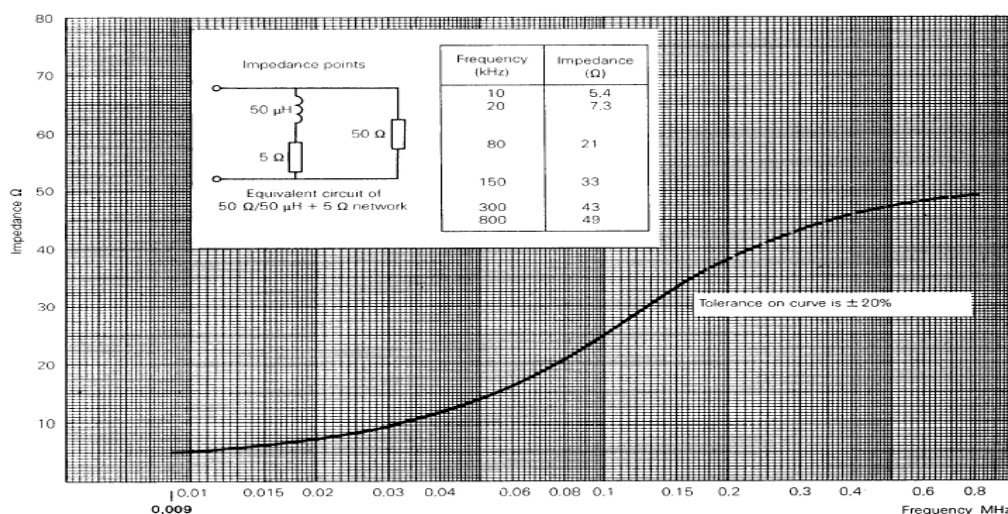


Fig 2. Impedance of LISN



4.3 Radiated Emission

Preliminary measurements were conducted 3 m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

Final measurements were made 3 m chamber (FCC registration No.: 443957) and/or 10 m OATS (FCC registration No.: 100749).

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non-metallic 1.0 m × 1.5 m table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

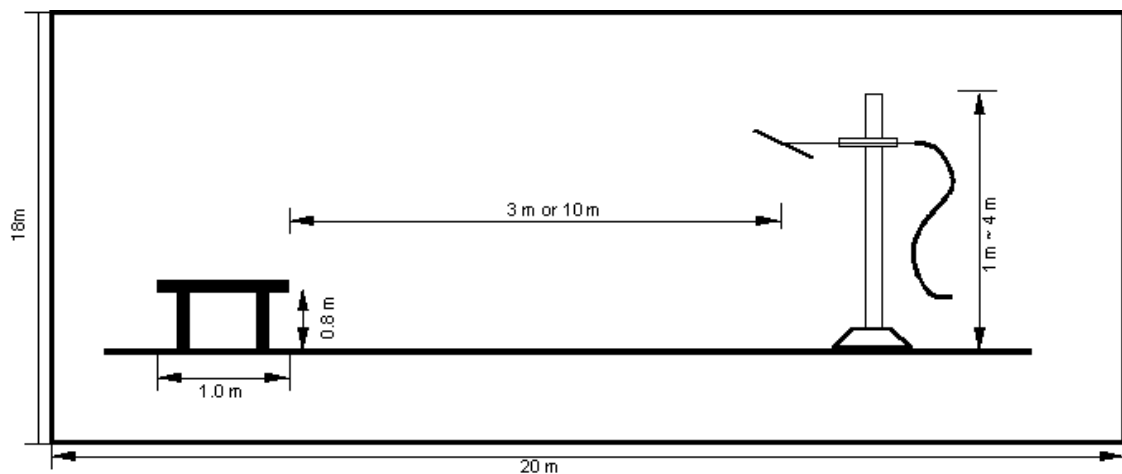


Fig 3. Dimensions of test site



5. Conducted Emission

5.1 Operating Environment

Temperature : 25 °C
Relative Humidity : 44 % R.H.

5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.

The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN & ISN.

AMN is bonded on horizontal reference ground plane.

The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

5.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO "Guide to the expression of uncertainty in measurement."

The measurement uncertainty was given with a confidence of 95 %.

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	± 2.71 dB	Confidence levels of 95 % ($k = 2$)
Conducted emission (150 kHz ~ 30 MHz)	± 3.34 dB	Confidence levels of 95 % ($k = 2$)



5.4 Limit

RFI Conducted	FCC Limit(dB μ V/m) Class B	
Freq. Range	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50
*Limits decreases linearly with the logarithm of frequency.		

5.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2011
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2011
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2011
□ - ISN T8	TESEQ. GmbH	ISN	24568	11. 09. 2011

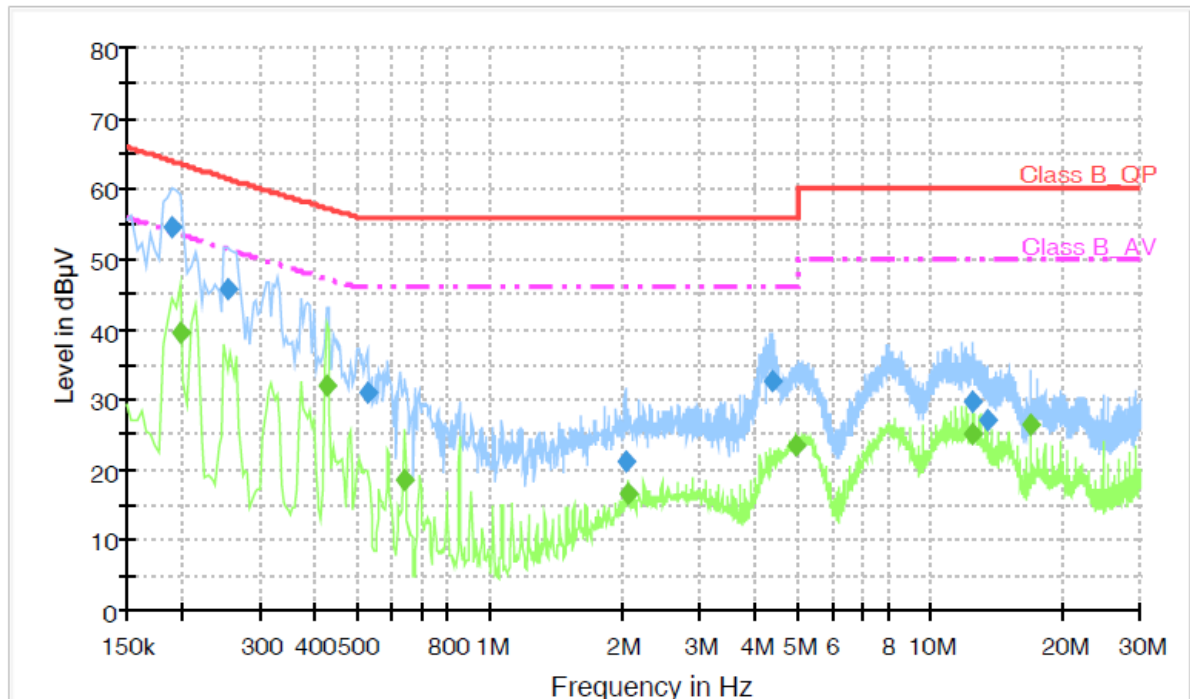
5.6 Test data for Conducted Emission

-. Test Date : May 26, 2011
-. Resolution Bandwidth : 9 kHz
-. Frequency Range : 0.15 MHz ~ 30 MHz



◆ Operating condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.190000	54.7	1000.000	9.000	GND	L1	10.1	9.2	63.9	
0.254000	45.7	1000.000	9.000	GND	L1	10.1	15.7	61.4	
0.526000	31.0	1000.000	9.000	GND	L1	10.1	25.0	56.0	
2.030000	21.1	1000.000	9.000	GND	L1	10.2	34.9	56.0	
4.366000	32.5	1000.000	9.000	GND	L1	10.3	23.5	56.0	
12.442000	29.6	1000.000	9.000	GND	L1	10.7	30.4	60.0	
13.438000	27.1	1000.000	9.000	GND	L1	10.8	32.9	60.0	

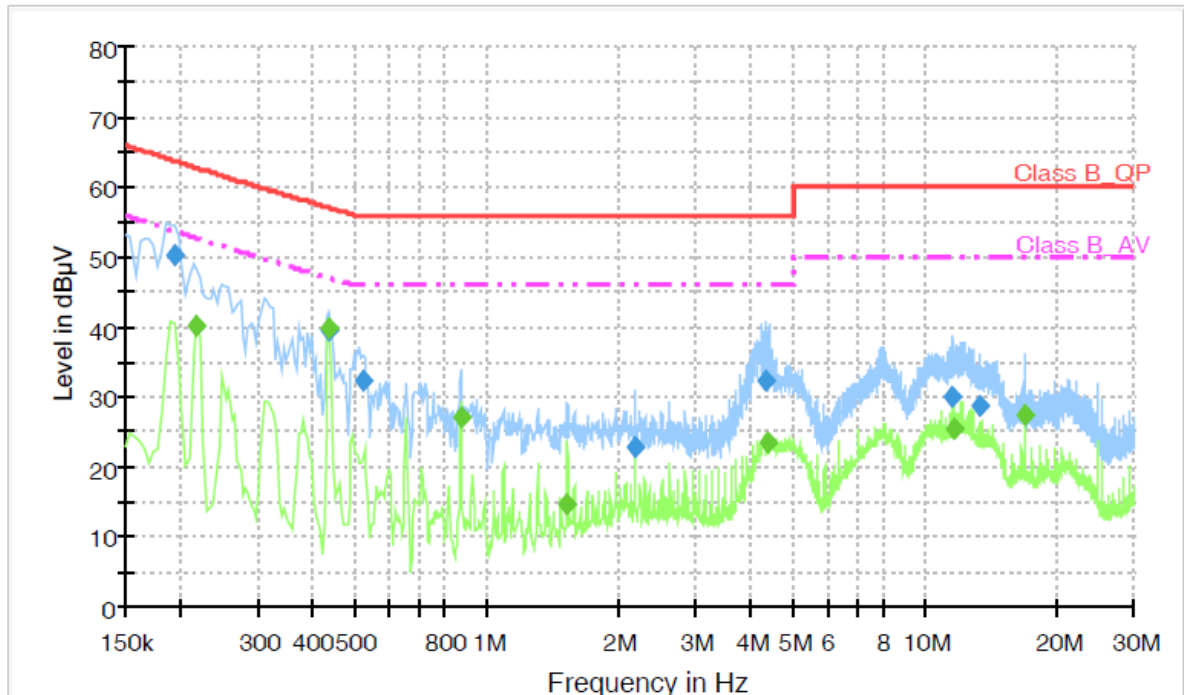
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.198000	39.6	1000.000	9.000	GND	L1	10.1	13.9	53.5	
0.426000	32.1	1000.000	9.000	GND	L1	10.1	15.1	47.2	
0.642000	18.5	1000.000	9.000	GND	L1	10.1	27.5	46.0	
2.062000	16.6	1000.000	9.000	GND	L1	10.2	29.4	46.0	
4.986000	23.5	1000.000	9.000	GND	L1	10.3	22.5	46.0	
12.442000	25.3	1000.000	9.000	GND	L1	10.7	24.7	50.0	
16.898000	26.6	1000.000	9.000	GND	L1	11.0	23.4	50.0	

< Fig 4. Graph of continuous disturbance (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	50.4	1000.000	9.000	GND	N	10.1	13.3	63.7	
0.438000	39.7	1000.000	9.000	GND	N	10.1	17.3	57.0	
0.522000	32.2	1000.000	9.000	GND	N	10.1	23.8	56.0	
2.190000	22.9	1000.000	9.000	GND	N	10.2	33.2	56.0	
4.318000	32.2	1000.000	9.000	GND	N	10.3	23.8	56.0	
11.594000	30.1	1000.000	9.000	GND	N	10.6	29.9	60.0	
13.414000	28.6	1000.000	9.000	GND	N	10.7	31.4	60.0	

Final Measurement Detector 2

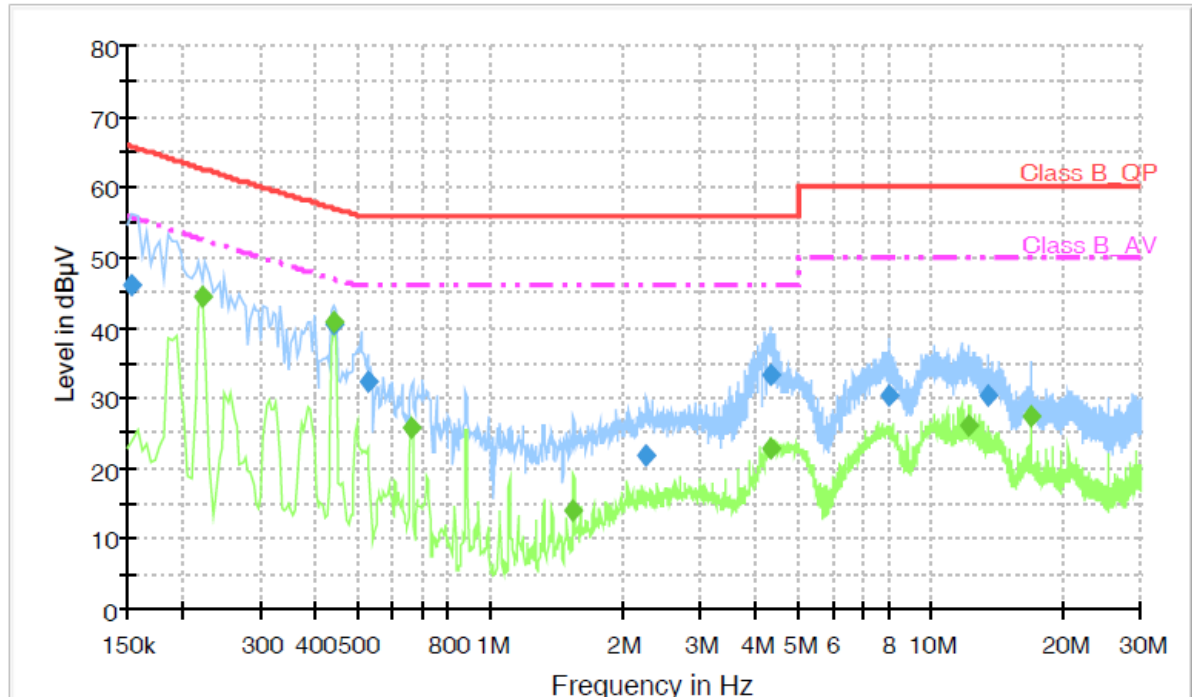
Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.218000	40.3	1000.000	9.000	GND	N	10.1	12.4	52.7	
0.438000	39.9	1000.000	9.000	GND	N	10.1	7.1	47.0	
0.874000	27.0	1000.000	9.000	GND	N	10.1	19.0	46.0	
1.530000	14.6	1000.000	9.000	GND	N	10.1	31.4	46.0	
4.374000	23.4	1000.000	9.000	GND	N	10.3	22.6	46.0	
11.598000	25.4	1000.000	9.000	GND	N	10.6	24.6	50.0	
16.894000	27.3	1000.000	9.000	GND	N	10.8	22.7	50.0	

< Fig 5. Graph of continuous disturbance (Neutral line) >



◆ Operating condition: 1 024 × 768 / 60 Hz (RGB: Analog)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.154000	45.9	1000.000	9.000	GND	L1	10.1	19.9	65.8	
0.442000	40.4	1000.000	9.000	GND	L1	10.1	16.6	57.0	
0.526000	32.4	1000.000	9.000	GND	L1	10.1	23.6	56.0	
2.266000	21.9	1000.000	9.000	GND	L1	10.2	34.1	56.0	
4.326000	33.3	1000.000	9.000	GND	L1	10.3	22.7	56.0	
8.054000	30.3	1000.000	9.000	GND	L1	10.5	29.7	60.0	
13.454000	30.4	1000.000	9.000	GND	L1	10.8	29.6	60.0	

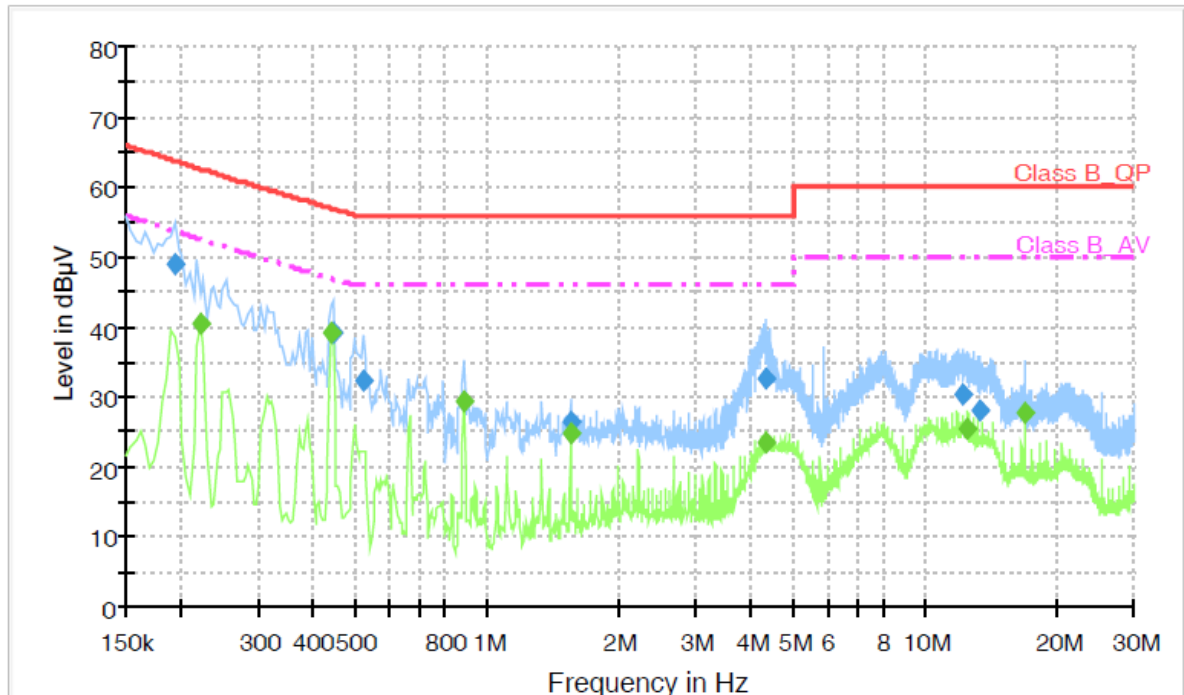
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.222000	44.3	1000.000	9.000	GND	L1	10.1	8.2	52.5	
0.442000	40.8	1000.000	9.000	GND	L1	10.1	6.1	46.9	
0.662000	25.6	1000.000	9.000	GND	L1	10.1	20.4	46.0	
1.546000	13.9	1000.000	9.000	GND	L1	10.1	32.1	46.0	
4.314000	23.0	1000.000	9.000	GND	L1	10.3	23.0	46.0	
12.174000	26.0	1000.000	9.000	GND	L1	10.7	24.0	50.0	
16.890000	27.3	1000.000	9.000	GND	L1	11.0	22.7	50.0	

< Fig 6. Graph of continuous disturbance (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.194000	48.9	1000.000	9.000	GND	N	10.1	14.8	63.7	
0.446000	39.2	1000.000	9.000	GND	N	10.1	17.7	56.9	
0.522000	32.3	1000.000	9.000	GND	N	10.1	23.7	56.0	
1.554000	26.5	1000.000	9.000	GND	N	10.1	29.5	56.0	
4.314000	32.8	1000.000	9.000	GND	N	10.3	23.2	56.0	
12.150000	30.3	1000.000	9.000	GND	N	10.6	29.7	60.0	
13.386000	28.2	1000.000	9.000	GND	N	10.7	31.8	60.0	

Final Measurement Detector 2

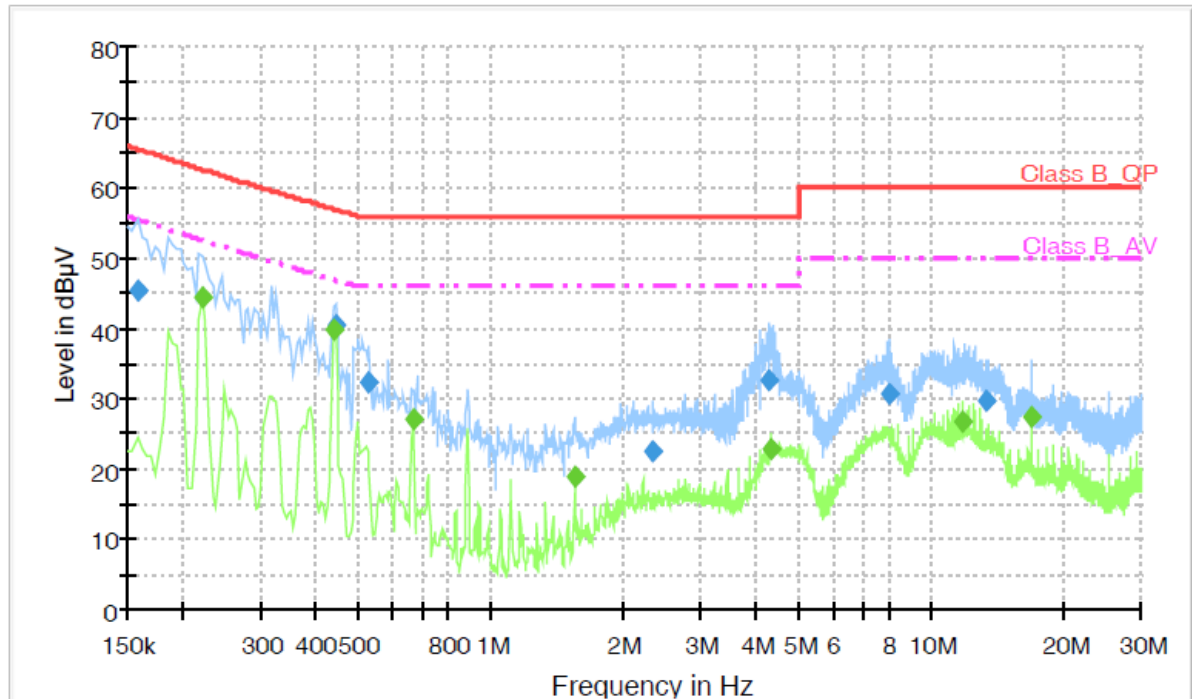
Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.222000	40.4	1000.000	9.000	GND	N	10.1	12.1	52.5	
0.442000	39.3	1000.000	9.000	GND	N	10.1	7.6	46.9	
0.886000	29.3	1000.000	9.000	GND	N	10.1	16.7	46.0	
1.554000	24.8	1000.000	9.000	GND	N	10.1	21.2	46.0	
4.326000	23.5	1000.000	9.000	GND	N	10.3	22.5	46.0	
12.430000	25.4	1000.000	9.000	GND	N	10.6	24.6	50.0	
16.890000	27.7	1000.000	9.000	GND	N	10.8	22.3	50.0	

< Fig 7. Graph of continuous disturbance (Neutral line) >



◆ Operating condition: 640 × 480 / 60 Hz (RGB: Analog)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.158000	45.5	1000.000	9.000	GND	L1	10.1	20.0	65.5	
0.446000	40.5	1000.000	9.000	GND	L1	10.1	16.4	56.9	
0.530000	32.3	1000.000	9.000	GND	L1	10.1	23.7	56.0	
2.334000	22.6	1000.000	9.000	GND	L1	10.2	33.4	56.0	
4.306000	32.5	1000.000	9.000	GND	L1	10.3	23.5	56.0	
8.050000	30.7	1000.000	9.000	GND	L1	10.5	29.3	60.0	
13.338000	29.8	1000.000	9.000	GND	L1	10.7	30.2	60.0	

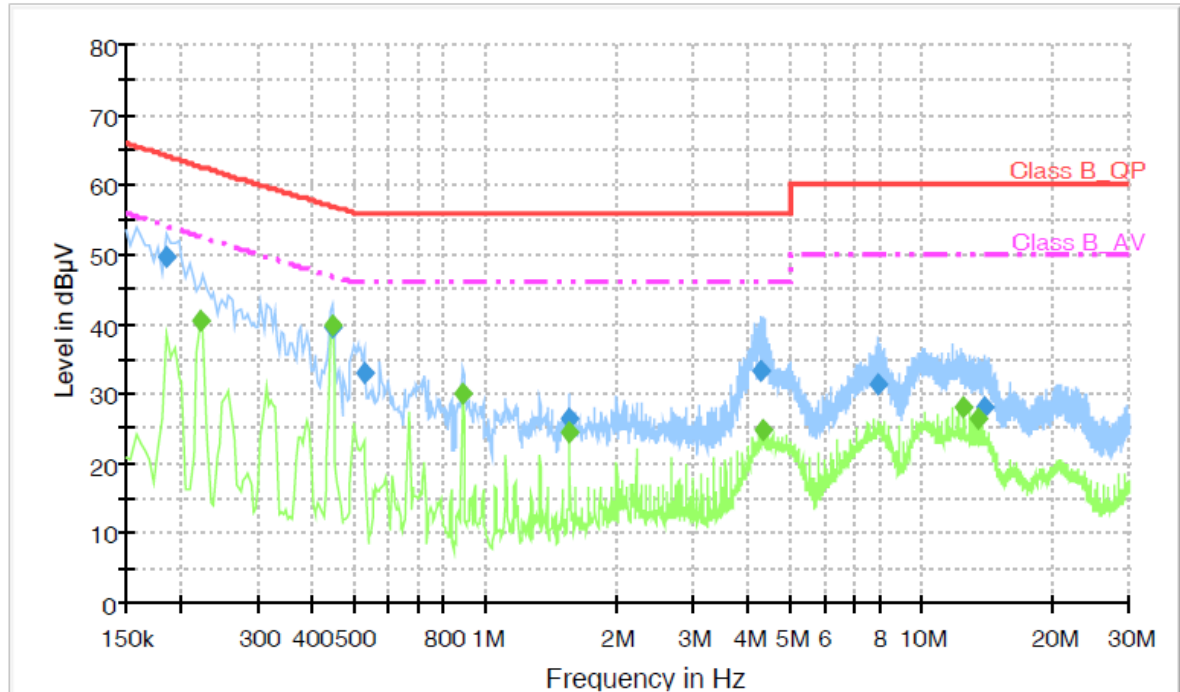
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.222000	44.4	1000.000	9.000	GND	L1	10.1	8.1	52.5	
0.442000	40.0	1000.000	9.000	GND	L1	10.1	6.9	46.9	
0.666000	27.0	1000.000	9.000	GND	L1	10.1	19.0	46.0	
1.554000	18.8	1000.000	9.000	GND	L1	10.1	27.2	46.0	
4.330000	22.9	1000.000	9.000	GND	L1	10.3	23.1	46.0	
11.778000	26.8	1000.000	9.000	GND	L1	10.6	23.2	50.0	
16.890000	27.4	1000.000	9.000	GND	L1	11.0	22.6	50.0	

< Fig 8. Graph of continuous disturbance (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.186000	49.8	1000.000	9.000	GND	N	10.1	14.3	64.1	
0.446000	39.6	1000.000	9.000	GND	N	10.1	17.3	56.9	
0.526000	32.8	1000.000	9.000	GND	N	10.1	23.2	56.0	
1.558000	26.4	1000.000	9.000	GND	N	10.1	29.6	56.0	
4.302000	33.2	1000.000	9.000	GND	N	10.3	22.8	56.0	
7.946000	31.3	1000.000	9.000	GND	N	10.4	28.7	60.0	
13.934000	28.1	1000.000	9.000	GND	N	10.7	31.9	60.0	

Final Measurement Detector 2

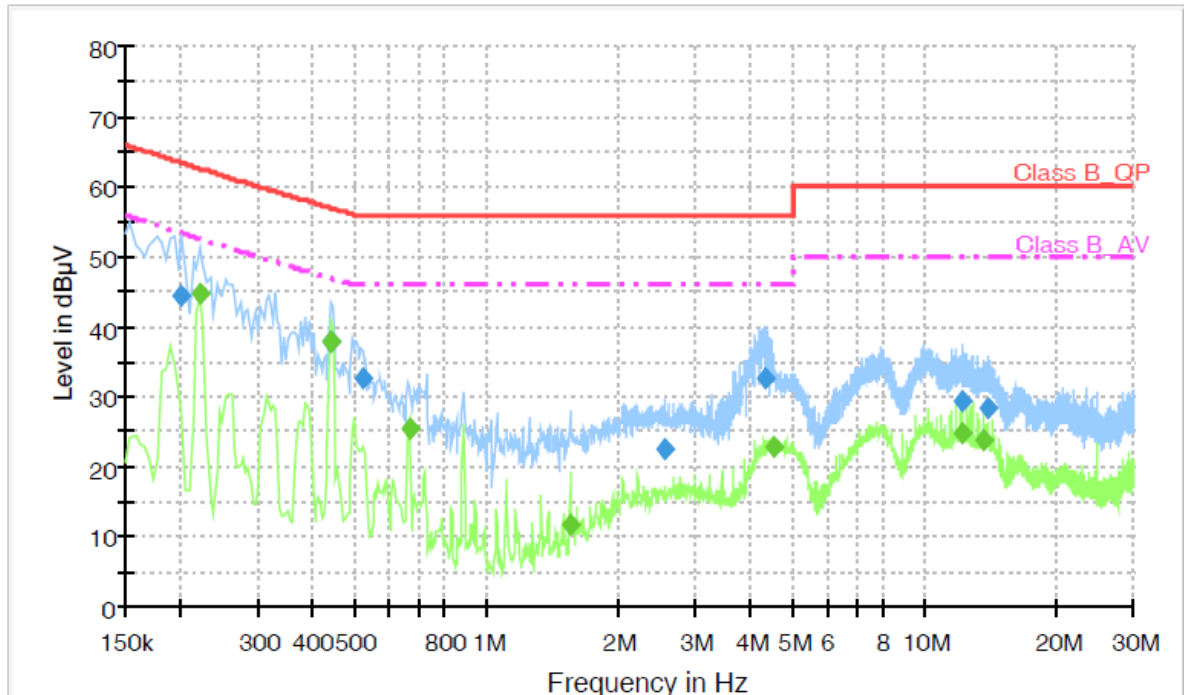
Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.222000	40.5	1000.000	9.000	GND	N	10.1	12.0	52.5	
0.446000	39.8	1000.000	9.000	GND	N	10.1	7.1	46.9	
0.890000	30.1	1000.000	9.000	GND	N	10.1	15.9	46.0	
1.558000	24.5	1000.000	9.000	GND	N	10.1	21.5	46.0	
4.338000	24.7	1000.000	9.000	GND	N	10.3	21.3	46.0	
12.458000	28.1	1000.000	9.000	GND	N	10.6	21.9	50.0	
13.570000	26.6	1000.000	9.000	GND	N	10.7	23.4	50.0	

< Fig 9. Graph of continuous disturbance (Neutral line) >



◆ Operating condition: 1 920 × 1 080 / 60 Hz (DVI: Digital)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.202000	44.5	1000.000	9.000	GND	L1	10.1	18.9	63.4	
0.442000	37.8	1000.000	9.000	GND	L1	10.1	19.2	57.0	
0.522000	32.6	1000.000	9.000	GND	L1	10.1	23.4	56.0	
2.546000	22.5	1000.000	9.000	GND	L1	10.2	33.5	56.0	
4.342000	32.7	1000.000	9.000	GND	L1	10.3	23.3	56.0	
12.246000	29.4	1000.000	9.000	GND	L1	10.7	30.6	60.0	
14.030000	28.3	1000.000	9.000	GND	L1	10.8	31.7	60.0	

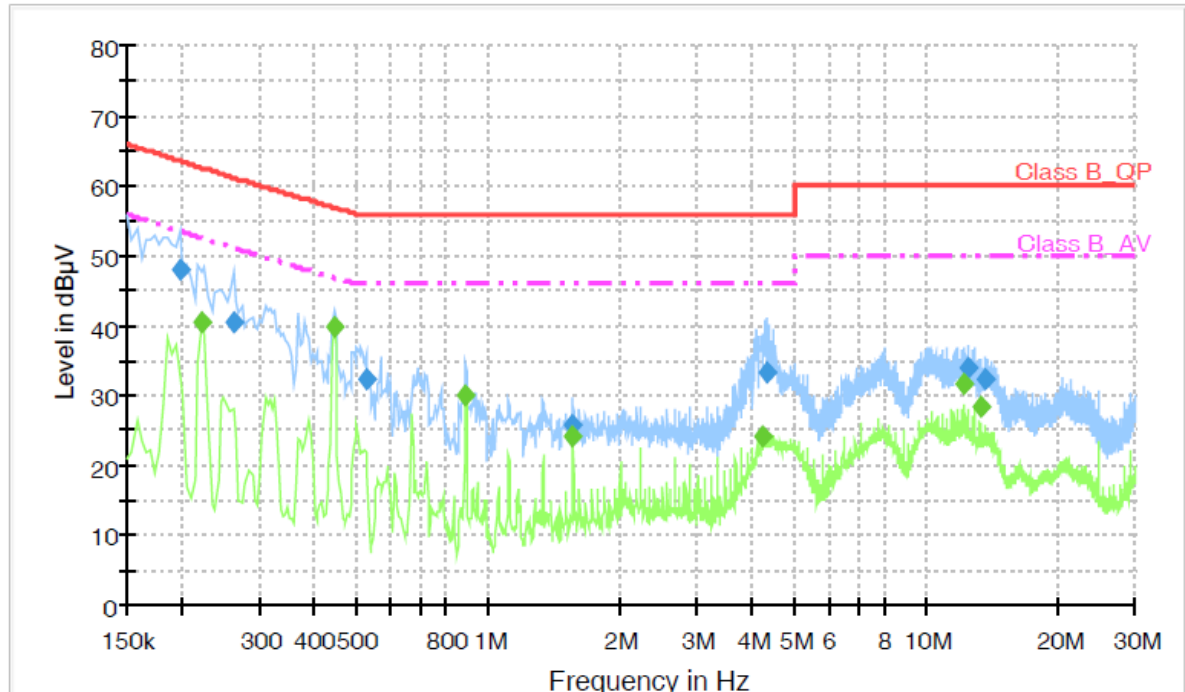
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.222000	44.6	1000.000	9.000	GND	L1	10.1	7.9	52.5	
0.442000	37.8	1000.000	9.000	GND	L1	10.1	9.1	46.9	
0.666000	25.6	1000.000	9.000	GND	L1	10.1	20.4	46.0	
1.554000	11.7	1000.000	9.000	GND	L1	10.1	34.3	46.0	
4.554000	23.0	1000.000	9.000	GND	L1	10.3	23.0	46.0	
12.246000	24.8	1000.000	9.000	GND	L1	10.7	25.2	50.0	
13.582000	23.9	1000.000	9.000	GND	L1	10.8	26.1	50.0	

< Fig 10. Graph of continuous disturbance (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.198000	47.9	1000.000	9.000	GND	N	10.1	15.6	63.5	
0.262000	40.6	1000.000	9.000	GND	N	10.1	20.6	61.2	
0.526000	32.5	1000.000	9.000	GND	N	10.1	23.5	56.0	
1.558000	25.8	1000.000	9.000	GND	N	10.1	30.2	56.0	
4.346000	33.4	1000.000	9.000	GND	N	10.3	22.6	56.0	
12.482000	34.1	1000.000	9.000	GND	N	10.6	25.9	60.0	
13.598000	32.4	1000.000	9.000	GND	N	10.7	27.6	60.0	

Final Measurement Detector 2

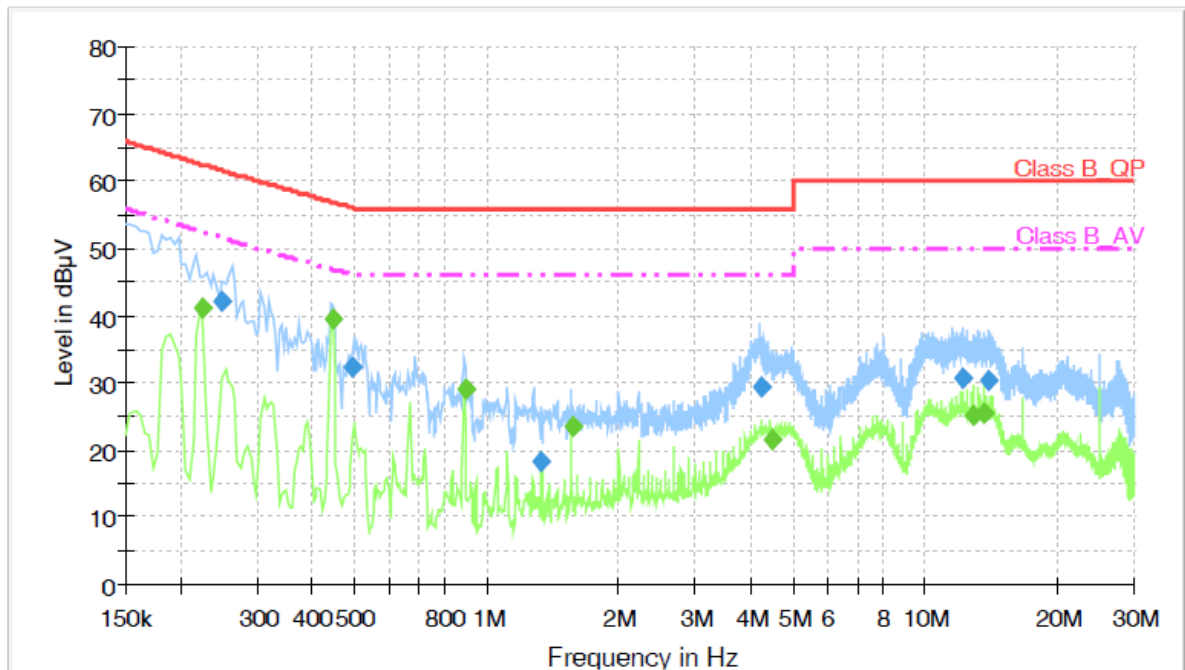
Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.222000	40.5	1000.000	9.000	GND	N	10.1	12.0	52.5	
0.446000	40.0	1000.000	9.000	GND	N	10.1	6.9	46.9	
0.890000	29.9	1000.000	9.000	GND	N	10.1	16.1	46.0	
1.562000	24.3	1000.000	9.000	GND	N	10.1	21.7	46.0	
4.238000	24.3	1000.000	9.000	GND	N	10.3	21.7	46.0	
12.262000	31.5	1000.000	9.000	GND	N	10.6	18.5	50.0	
13.378000	28.3	1000.000	9.000	GND	N	10.7	21.7	50.0	

< Fig 11. Graph of continuous disturbance (Neutral line) >



◆ Operating condition: 1 920 × 1 080 / 60 Hz (HDMI: Digital)

Voltage with 4-Line-LISN_L1



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.248000	42.1	1000.000	9.000	GND	L1	10.1	19.5	61.6	
0.496000	32.3	1000.000	9.000	GND	L1	10.1	23.8	56.1	
1.328000	18.2	1000.000	9.000	GND	L1	10.1	37.8	56.0	
4.236000	29.5	1000.000	9.000	GND	L1	10.3	26.5	56.0	
12.240000	30.7	1000.000	9.000	GND	L1	10.7	29.3	60.0	
13.968000	30.5	1000.000	9.000	GND	L1	10.8	29.5	60.0	

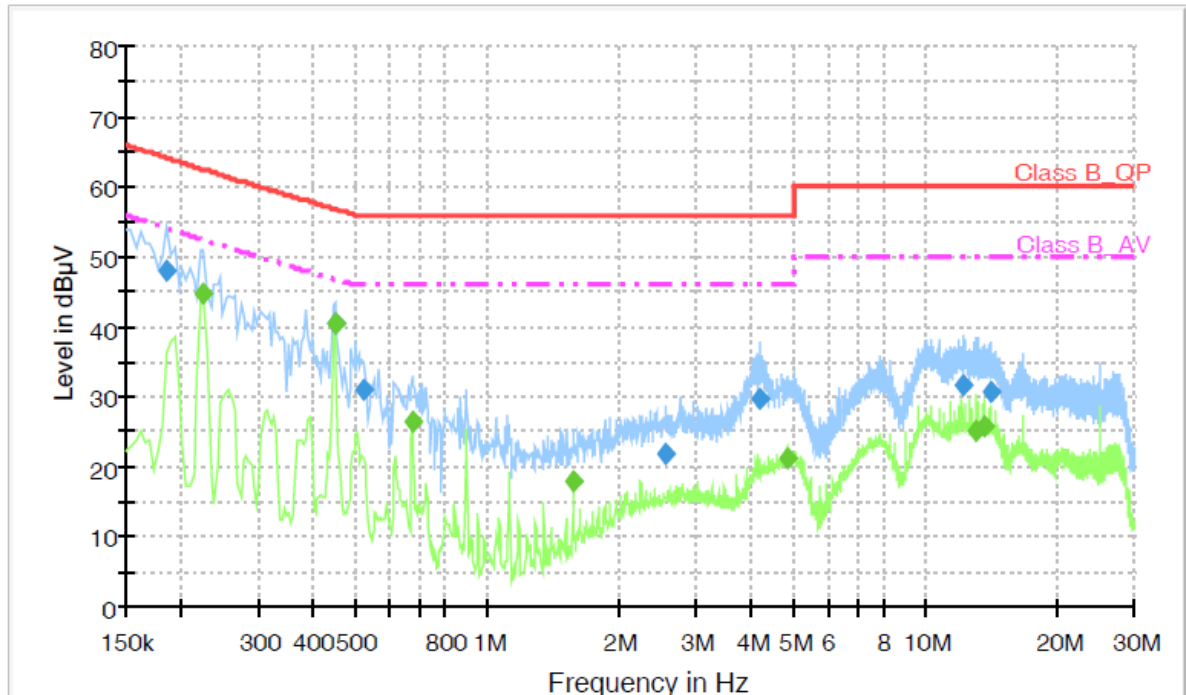
Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.224000	41.0	1000.000	9.000	GND	L1	10.1	11.4	52.4	
0.448000	39.5	1000.000	9.000	GND	L1	10.1	7.3	46.8	
0.896000	29.1	1000.000	9.000	GND	L1	10.1	16.9	46.0	
1.568000	23.5	1000.000	9.000	GND	L1	10.1	22.5	46.0	
4.476000	21.5	1000.000	9.000	GND	L1	10.3	24.5	46.0	
12.976000	25.0	1000.000	9.000	GND	L1	10.7	25.0	50.0	
13.624000	25.4	1000.000	9.000	GND	L1	10.8	24.6	50.0	

< Fig 12. Graph of continuous disturbance (Live line) >



Voltage with 4-Line-LISN_N



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.186000	47.9	1000.000	9.000	GND	N	10.1	16.2	64.1	
0.450000	40.6	1000.000	9.000	GND	N	10.1	16.2	56.8	
0.522000	30.9	1000.000	9.000	GND	N	10.1	25.1	56.0	
2.558000	21.9	1000.000	9.000	GND	N	10.2	34.1	56.0	
4.182000	29.8	1000.000	9.000	GND	N	10.3	26.2	56.0	
12.166000	31.6	1000.000	9.000	GND	N	10.6	28.4	60.0	
14.146000	30.8	1000.000	9.000	GND	N	10.7	29.2	60.0	

Final Measurement Detector 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
0.226000	44.6	1000.000	9.000	GND	N	10.1	7.8	52.4	
0.450000	40.5	1000.000	9.000	GND	N	10.1	6.3	46.8	
0.674000	26.4	1000.000	9.000	GND	N	10.1	19.6	46.0	
1.570000	17.9	1000.000	9.000	GND	N	10.1	28.1	46.0	
4.826000	21.2	1000.000	9.000	GND	N	10.3	24.8	46.0	
13.022000	25.1	1000.000	9.000	GND	N	10.6	24.9	50.0	
13.698000	25.7	1000.000	9.000	GND	N	10.7	24.3	50.0	

< Fig 13. Graph of continuous disturbance (Neutral line) >



6. Radiated Emission

6.1 Operating Environment

Temperature : 16 °C
Relative Humidity : 55 % R.H.

6.2 Test Set-up

A preliminary scan with peak mode was performed in the semi anechoic chamber and found frequency for test site. The formal radiated emission was measured at 10 m distance open area test site and 3 m distance anechoic chamber. The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane. The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

6.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.

The measurement uncertainty was given with a confidence of 95 %.

Test Items(Open area test site)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 10 m, Vertical)	± 4.03 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (30 MHz ~ 300 MHz, 10 m, Horizontal)	± 3.96 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Vertical)	± 4.01 dB	Confidence levels of 95 % ($k = 2$)
Radiated emission (300 MHz ~ 1 000 MHz, 10 m, Horizontal)	± 3.88 dB	Confidence levels of 95 % ($k = 2$)



6.4 Limit

Frequency (MHz)	FCC Limit @ 3 m. dB μ V/m	CISPR Limit @ 10 m. dB μ V/m
30 ~ 88	40.0	30.0
88 ~ 216	43.5	30.0
216 ~ 230	46.0	30.0
230 ~ 960	46.0	37.0
960 ~ 1 000	54.0	37.0
> 1 000	54.0	No Specified limit

6.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2011
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2012
■ - BBHA9120D	Schwarzbeck	Horn ANT	207	12. 22. 2011
■ - MCU066	maturo GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	maturo GmbH	Turntable	1390307	N/A
■ - AM 4.0	maturo GmbH	Antenna Mast	1390308	N/A
■ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258942	11. 12. 2011
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2011
■ - HK116	Rohde & Schwarz	Biconical Antenna	832639/007	03. 15. 2012
■ - HL223	Rohde & Schwarz	Log Periodic Antenna	835998/004	03. 15. 2012
■ - HD100	HD GmbH	Position Controller	100/692/01	N/A
■ - DS415S	HD GmbH	Turntable	415/657/01	N/A
■ - MA240	HD GmbH	Antenna Mast	240/565/01	N/A

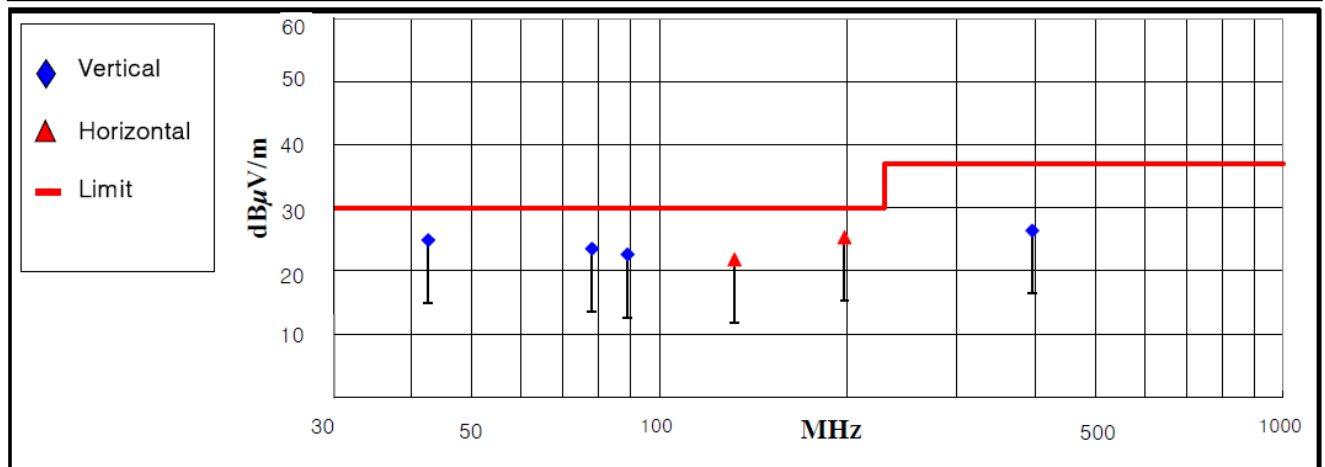


6.6 Test data for Radiated Emission

- Test Date : May 26 ~ 31, 2011
- Resolution Bandwidth : 120 kHz/1 MHz
- Measurement Distance : 10 m / 3 m
- Frequency Range (Detector mode) : 30 MHz ~ 1 GHz (Quasi-peak detector mode)
1 GHz ~ 2 GHz (Average detector mode, Peak detector mode)
- Note : The highest frequency of the internal source of the EUT is between 108 MHz and 500 MHz (148.5 MHz). The measurement was made up to 2 000 MHz

◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)

Frequency (MHz)	Measurement Level				Limit (dBμV/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμV)	Factor(dB/m)	Loss(dB)	(dBμV/m)			(H/V)	(cm)	(°)
42.59	12.56	10.75	1.57	24.88	30.00	5.12	V	109	335
77.96	12.79	8.50	2.21	23.50	30.00	6.50	V	120	331
88.87	11.60	8.62	2.38	22.60	30.00	7.40	V	145	62
132.03	7.26	11.60	2.94	21.80	30.00	8.20	H	233	115
198.07	7.14	14.42	3.74	25.30	30.00	4.70	H	142	98
396.12	4.82	16.08	5.50	26.40	37.00	10.60	V	128	69

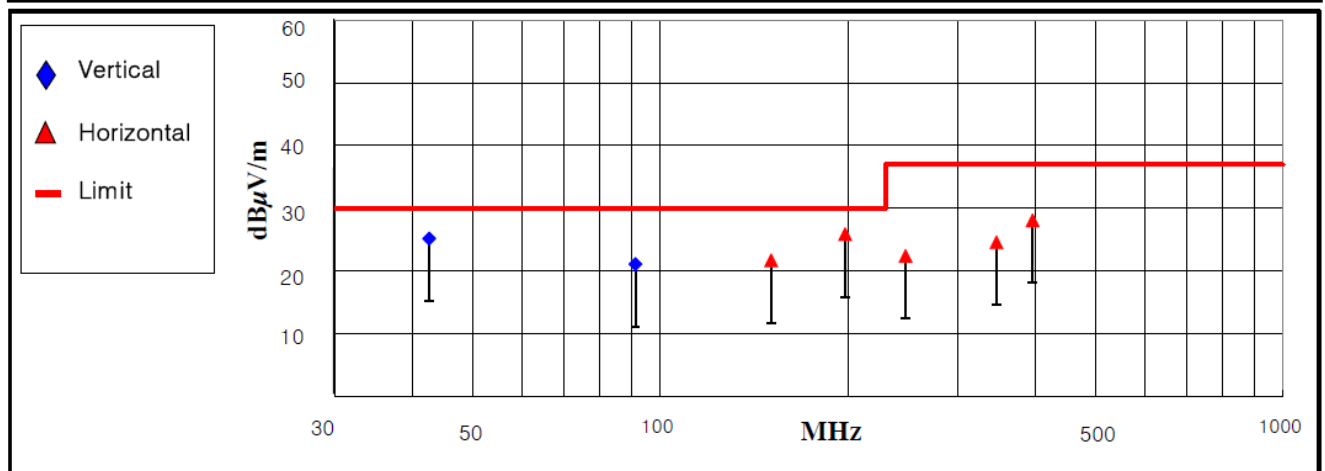


< Fig 14. Radiated emission result (30 MHz ~ 1 000 MHz) >



◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DVI: Digital)

Frequency (MHz)	Measurement Level				Limit (dBμV/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμV)	Factor(dB/m)	Loss(dB)	(dBμV/m)			(H/V)	(cm)	(°)
42.51	12.84	10.77	1.57	25.18	30.00	4.82	V	100	330
91.18	9.94	8.74	2.42	21.10	30.00	8.90	V	153	62
150.58	6.55	11.97	3.18	21.70	30.00	8.30	H	221	318
198.03	7.74	14.42	3.74	25.90	30.00	4.10	H	128	72
247.59	4.77	13.39	4.24	22.40	37.00	14.60	H	132	83
346.60	5.03	14.45	5.12	24.60	37.00	12.40	H	110	16
396.12	6.52	16.08	5.50	28.10	37.00	8.90	H	100	22

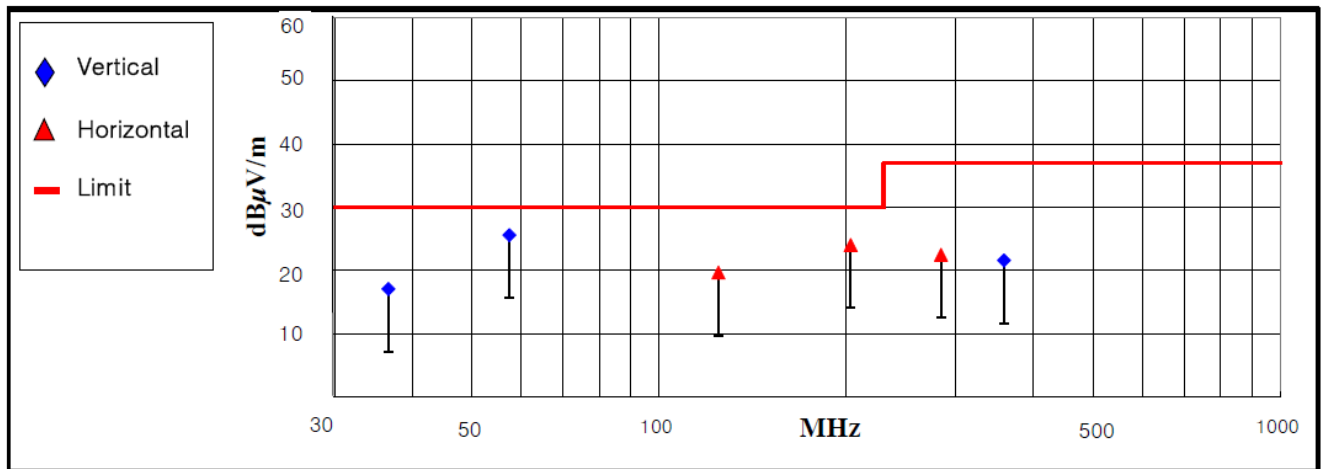


< Fig 15. Radiated emission result (30 MHz ~ 1 000 MHz) >



◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI: Analog)

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol.	Height	Angle
	Value(dBμ V)	Factor(dB/m)	Loss(dB)	(dBμ V/m)			(H/V)	(cm)	(°)
36.61	4.05	11.60	1.45	17.10	30.00	12.90	V	133	122
57.34	15.35	8.39	1.86	25.60	30.00	4.40	V	101	130
124.53	5.48	11.37	2.85	19.70	30.00	10.30	H	240	90
203.33	5.83	14.43	3.80	24.06	30.00	5.94	H	126	180
284.20	1.63	16.30	4.57	22.50	37.00	14.50	H	100	63
359.02	1.52	14.86	5.22	21.60	37.00	15.40	V	155	211

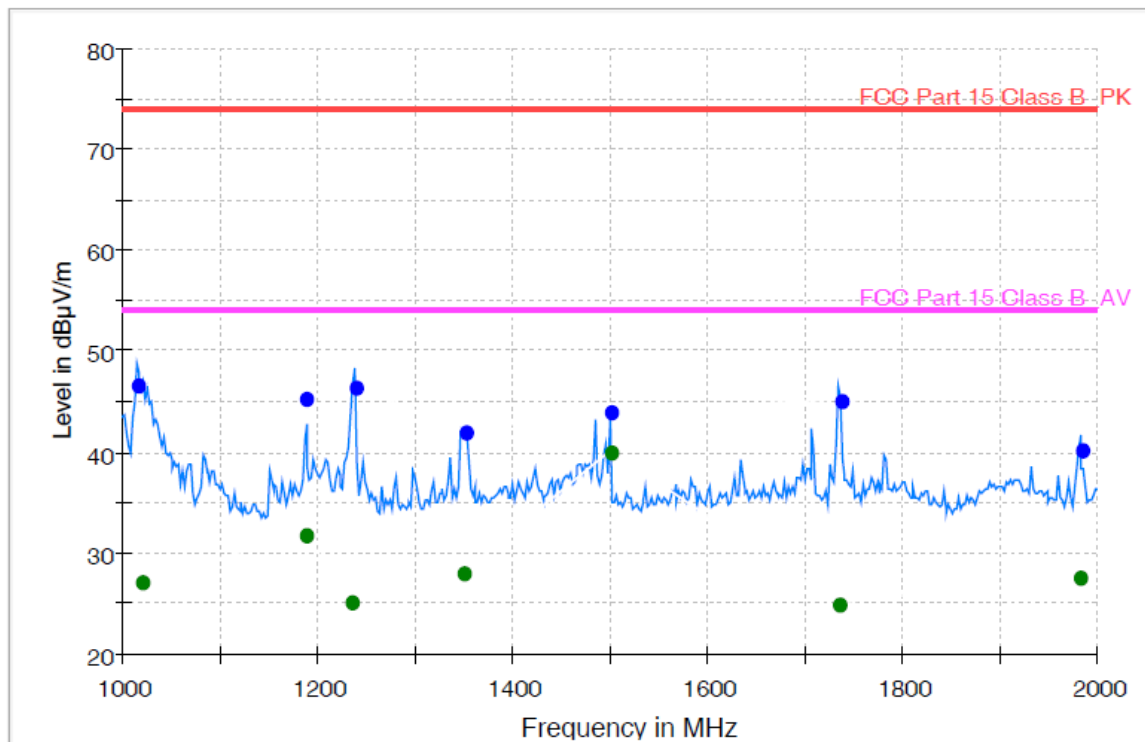


< Fig 16. Radiated emission result (30 MHz ~ 1 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (RGB: Analog)
Green marker: Average detector, Blue marker: Peak detector

Radiated Emission_above 1 GHz



Final Result [1]

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1015.828056	46.8	100.0	1000.000	156.0	V	189.0	-14.4	27.2	74.0
1188.176754	45.4	100.0	1000.000	163.0	V	164.0	-13.7	28.6	74.0
1239.076954	46.7	100.0	1000.000	100.0	V	181.0	-13.6	27.3	74.0
1350.897395	42.1	100.0	1000.000	100.0	V	148.0	-13.3	30.9	74.0
1500.002004	44.1	100.0	1000.000	130.0	V	-6.0	-13.0	29.9	74.0
1735.266934	45.2	100.0	1000.000	100.0	V	197.0	-12.4	28.8	74.0
1983.763928	40.4	100.0	1000.000	280.0	V	188.0	-11.7	33.6	74.0

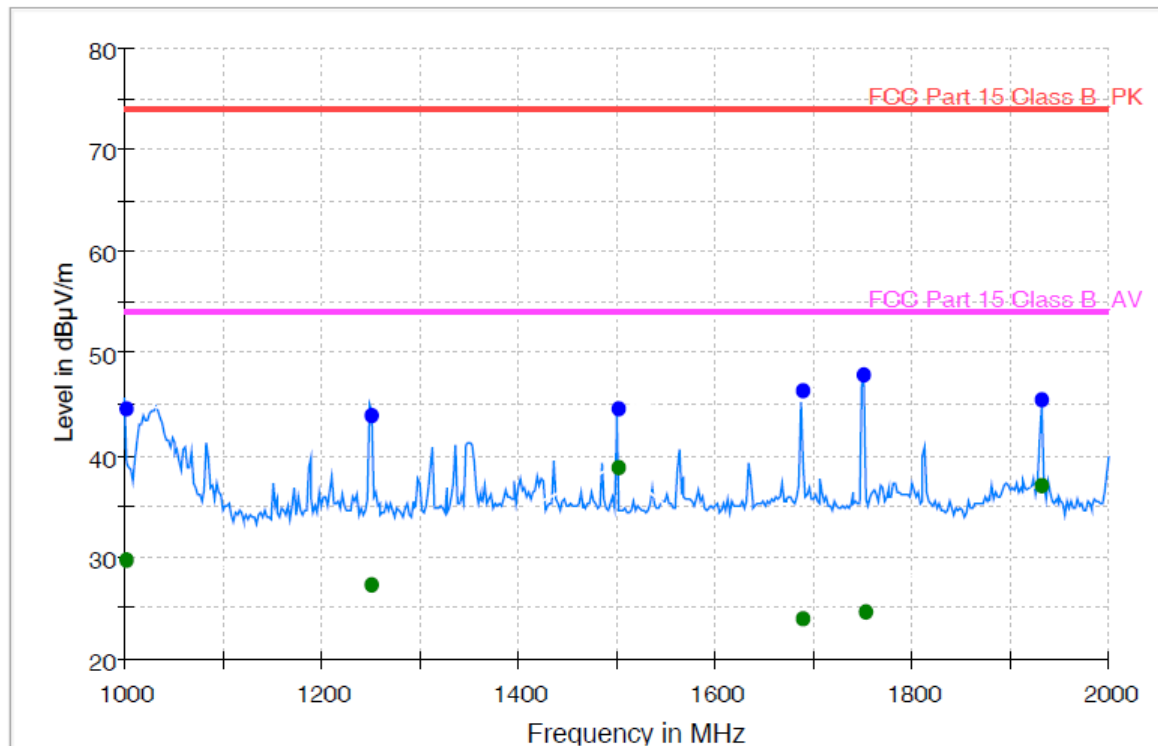
Final Result [2]

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1018.228056	27.3	100.0	1000.000	163.0	V	192.0	-14.4	26.7	54.0
1188.176754	31.9	100.0	1000.000	113.0	V	161.0	-13.7	22.1	54.0
1233.476954	25.4	100.0	1000.000	100.0	V	201.0	-13.6	28.6	54.0
1348.897395	28.3	100.0	1000.000	100.0	V	153.0	-13.3	25.7	54.0
1500.402004	40.1	100.0	1000.000	100.0	V	2.0	-13.0	13.9	54.0
1733.666934	25.1	100.0	1000.000	100.0	V	197.0	-12.4	27.9	54.0
1980.963928	27.8	100.0	1000.000	271.0	V	188.0	-11.7	26.2	54.0

< Fig 17. Radiated emission result (1 000 MHz ~ 2 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (DVI: Digital)
Green marker: Average detector, Blue marker: Peak detector
Radiated Emission_above 1 GHz



Final Result [1]

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	44.9	100.0	1000.000	146.0	V	25.0	-14.4	29.1	74.0
1249.896994	44.2	100.0	1000.000	100.0	V	186.0	-13.6	29.8	74.0
1500.402004	44.8	100.0	1000.000	100.0	V	15.0	-13.0	29.2	74.0
1687.174750	46.5	100.0	1000.000	100.0	H	210.0	-12.6	27.5	74.0
1749.703006	48.0	100.0	1000.000	100.0	H	204.0	-12.3	26.0	74.0
1930.463727	45.7	100.0	1000.000	100.0	H	179.0	-12.0	28.3	74.0

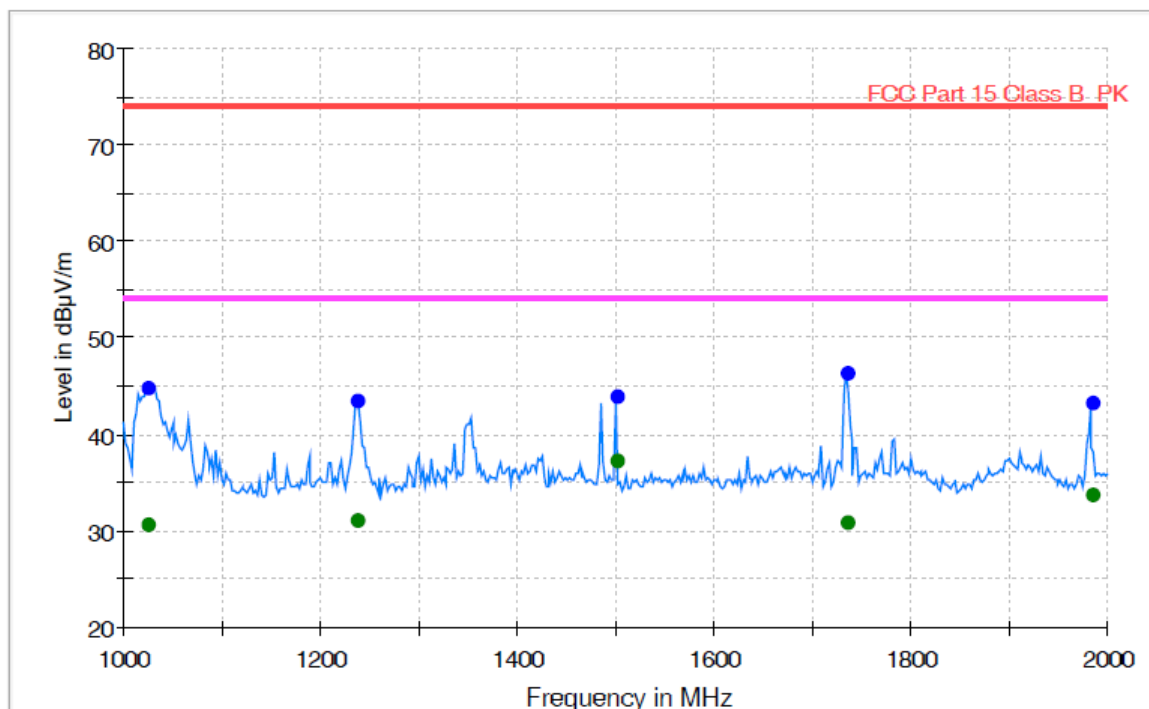
Final Result [2]

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1000.000000	30.1	100.0	1000.000	154.0	V	32.0	-14.4	23.9	54.0
1247.896994	27.5	100.0	1000.000	100.0	V	186.0	-13.6	26.5	54.0
1500.402004	39.1	100.0	1000.000	100.0	V	2.0	-13.0	14.9	54.0
1687.574750	24.1	100.0	1000.000	100.0	H	203.0	-12.6	29.9	54.0
1750.103006	24.8	100.0	1000.000	100.0	H	204.0	-12.3	29.2	54.0
1930.463727	37.3	100.0	1000.000	100.0	H	179.0	-12.0	16.7	54.0

< Fig 18. Radiated emission result (1 000 MHz ~ 2 000 MHz) >



- ◆ Operating Condition: 1 920 × 1 080 / 60 Hz (HDMI: Digital)
Green marker: Average detector, Blue marker: Peak detector
Radiated Emission_above 1 GHz



Final Result [1]

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1024.048096	45.1	100.0	1000.000	286.0	V	186.0	-14.3	28.9	74.0
1236.472946	43.7	100.0	1000.000	163.0	H	240.0	-13.6	30.3	74.0
1501.002004	44.2	100.0	1000.000	102.0	H	23.0	-13.0	29.8	74.0
1733.466934	46.5	100.0	1000.000	225.0	V	165.0	-12.4	27.5	74.0
1981.963928	43.5	100.0	1000.000	209.0	V	149.0	-11.7	30.5	74.0

Final Result [2]

Frequency (MHz)	CAverage (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1024.048096	30.9	100.0	1000.000	280.0	V	172.0	-14.3	23.1	54.0
1236.472946	31.3	100.0	1000.000	152.0	H	216.0	-13.6	22.7	54.0
1501.002004	37.5	100.0	1000.000	100.0	H	20.0	-13.0	16.5	54.0
1733.466934	31.0	100.0	1000.000	168.0	V	148.0	-12.4	23.0	54.0
1981.963928	33.9	100.0	1000.000	175.0	V	150.0	-11.7	20.1	54.0

< Fig 19. Radiated emission result (1 000 MHz ~ 2 000 MHz) >



7. Sample Calculations

$$\begin{aligned}\text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)}\end{aligned}$$

7.1 Example 1 :

■ 20.3 MHz

Class B Limit	= 250 μV = 48 dB μV
Reading	= 39.2 dB μV
$10^{(39.2\text{dB}\mu\text{V}/20)}$	= 91.2 μV
Margin	= 48 dB μV - 39.2 dB μV = 8.8 dB

7.2 Example 2 :

■ 66.7 MHz

Class B Limit	= 100 $\mu\text{V}/\text{m}$ = 40.0 dB $\mu\text{V}/\text{m}$
Reading	= 31.0 dB μV
Antenna Factor + Cable Loss = 5.8 dB	
Total	= 36.8 dB $\mu\text{V}/\text{m}$
Margin	= 40.0 dB $\mu\text{V}/\text{m}$ – 36.8 dB $\mu\text{V}/\text{m}$ = 3.2 dB



8. Recommendation & Conclusion

The data collected shows that the **LG Electronics Inc. LED LCD Monitor (Model Name: D2770P)** was complies with §15.107 and 15.109 of the FCC Rules.